

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

26 MAY 2005

Applicant's or agent's file reference 22013PCAU	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).	
International Application No. PCT/AU2003/001372	International Filing Date (day/month/year) 16 October 2003	Priority Date (day/month/year) 28 November 2002
International Patent Classification (IPC) or national classification and IPC Int. Cl. <sup>7</sup> E02F 5/12, 5/22		
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- This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 3 sheets, including this cover sheet.  
☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 10 sheet(s).

- This report contains indications relating to the following items:

- |      |                                     |   |
|------|-------------------------------------|---|
| I    | <input checked="" type="checkbox"/> | Basis of the report   |
| II   | <input type="checkbox"/>            | Priority  |
| III  | <input type="checkbox"/>            | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability  |
| IV   | <input type="checkbox"/>            | Lack of unity of invention  |
| V    | <input checked="" type="checkbox"/> | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| VI   | <input type="checkbox"/>            | Certain documents cited   |
| VII  | <input type="checkbox"/>            | Certain defects in the international application  |
| VIII | <input type="checkbox"/>            | Certain observations on the international application   |

Date of submission of the demand 7 June 2004	Date of completion of the report 8 November 2004
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer  LEOPOLD FILIPOVIC Telephone No. (02) 6283 2105

**Basis of the report**

With regard to the elements of the international application:\*

☐ the international application as originally filed.

☒ the description, pages **1 and 5-8**, as originally filed,  
pages , filed with the demand,  
pages **2, 3 and 3/1**, received on **28 October 2004** with the letter of **28 October 2004**  
pages **4 and 4/1**, received on **23 August 2004** with the letter of **23 August 2004**

☒ the claims, page **14**, as originally filed,  
pages , as amended (together with any statement) under Article 19,  
pages , filed with the demand,  
pages **9-12**, received on **28 October 2004** with the letter of **28 October 2004**  
page **13**, received on **23 August 2004** with the letter of **23 August 2004**

☒ the drawings, pages **1 and 2**, as originally filed,  
pages , filed with the demand,  
pages , received on with the letter of

☐ the sequence listing part of the description:

pages , as originally filed  
pages , filed with the demand  
pages , received on with the letter of

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).☐ the language of publication of the international application (under Rule 48.3(b)).☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.☐ filed together with the international application in computer readable form.☐ furnished subsequently to this Authority in written form.☐ furnished subsequently to this Authority in computer readable form.☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages☐ the claims, Nos.☐ the drawings, sheets/fig.

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).\*\*

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

\*\* Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report

**Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****Statement**

Novelty (N)	Claims 1-30	YES
	Claims	NO
Inventive step (IS)	Claims 1-30	YES
	Claims	NO
Industrial applicability (IA)	Claims 1-30	YES
	Claims	NO

**2. Citations and explanations (Rule 70.7)**

The documents cited in the International Search Report have been considered for the purpose of this report.

**NOVELTY, Claims 1-30**

None of the documents cited discloses all the features of the invention defined in claims 1-30.

Therefore the subject matter of these claims is new and meets the requirements of Article 33(2) PCT with regard to novelty.

**INVENTIVE STEP, Claims 1-30**

Claims 1-30 meet the criteria set out in PCT Article 33(3) with regard to the requirement of Inventive Step because the prior art does not obviously suggest to a person skilled in the art the feature of conveying at least a portion of excavated trench material created by the excavating means immediately after excavation to the bedding material forming means. The claimed invention is not obvious in the light of any of the cited documents nor is it disclosed in any obvious combination of them. It is also considered that it would not be obvious to a person skilled in the art in the light of common general knowledge either by itself or in combination with any of these documents.

material being placed onto a vibrating screen arrangement with such fine material being deposited directly into the base of the excavated trench with coarser material being returned to the ground adjacent the trench. As the apparatus moves along the trench a degree of levelling of the finer bedding material deposited in the base of the trench is achieved. Thus part of the problems associated with the apparatus disclosed associated with the apparatus disclosed in Australian Patent Specification No. 592815 are resolved, however, there remains the problems of having a trench forming machine undertake a first pass, the bedding material forming apparatus undertake a second pass along the trench and having separate machinery such as a front end loader or the like pick up and deposit excavated material onto the bedding material forming or supply apparatus. These separate handling and operational steps increase the number of operational personnel required, the operational steps involved and the machinery required thereby increasing the time and cost of installing pipelines.

The objective of the present invention is to provide apparatus capable of forming a pipeline trench and laying a pipeline bedding material from the excavated trench material into the trench via substantially a one pass operation without the need to bring to the site separate bedding or pipeline surround material such as sand or the like.

Accordingly, the present invention provides apparatus for forming a trench and preparing a base region of the trench for laying an elongate member such as a pipeline, cable or the like therein, said apparatus including a trench forming machine having excavating means adapted to excavate the trench as the trench forming machine is moved in a forward direction, a bedding material forming means positionable, in use, at least partly above the trench formed by the excavating means of said trench forming machine and being adapted to move simultaneously along said trench with said trench forming machine as the trench forming machine moves in said forward direction, said apparatus further including conveyor means for conveying at least a portion of excavated trench material created by said excavating means immediately after excavation to said bedding material forming means, said bedding material forming means including separation means for separating fine particulate material from the excavated

trench material delivered thereto by said conveyor means whereby said fine particulate material is adapted to be delivered to the base region of said trench.

The pipeline bedding material forming means might conveniently be constructed as an integral part of the trench forming machine or alternatively, may  
5 be separate from the trench forming machine but pulled along the trench by connection means between the trench forming machine and the pipeline bedding material forming means. In this preferred embodiment, the connection means may be one or more cable(s) or chain(s) extending from a low point within the trench on the bedding material forming means to a more elevated position on the  
10 trench forming machine.

Preferred aspects and features of this invention may be as defined in claims 6 to 17 annexed hereto, which claims are hereby made part of the disclosure of this specification.

In accordance with a further aspect, the present invention provides a  
15 method of forming a trench and preparing a base region of the trench for laying an elongate member such as a pipeline or cable therein, said method including the steps of providing a trench forming machine and excavating ground material from a zone intended to form the trench while moving said trench forming machine in a forward direction, conveying at least a portion of said ground  
20 material excavated from said zone intended to form the trench immediately after excavation directly to separation apparatus for separating fine particulate material from the excavated ground material and depositing the fine particulate material into the base region of said trench as said separation apparatus is moved along said trench with said trench forming machine.

25 Preferred features of the foregoing method may be as defined in claims 20 to 23 annexed hereto, which claims are hereby made part of the disclosure of this invention.

By arrangements and methods as disclosed in the foregoing, it is possible to create a trench and simultaneously deposit a pipeline bedding material in the  
30 base of the trench during one pass of the machinery, thereby making significant time and cost savings.

In accordance with a still further aspect, the present invention provides a method of laying an elongate member (such as a pipeline, cable or the like) in an underground position, said method including the steps of providing a trench

forming machine and excavating ground material from a zone intended to form a trench while moving said trench forming machine in a forward direction, conveying at least a portion of said excavated ground material from said zone intended to form the trench immediately after excavation directly to first  
5 separation apparatus for separating fine particulate material from the excavated ground material and depositing the fine particulate material into a base region of the trench as said first separation apparatus is moved along said trench, laying said elongate member on said fine particulate material in the base region of said trench, and thereafter passing second separation apparatus along said trench,  
10 said second separation apparatus also receiving at least a portion of said excavated ground material and delivering fine particulate material from said excavated ground material into said trench depositing same around and over said elongate member. In a particularly preferred application of this method, the elongate member maybe a pipeline or conduit of continuous length or of joined  
15 separate sections.

Preferred features and aspects of the aforesaid method may be as defined in claims 25 to 30 inclusive as annexed hereto, the subject matter of these claims being made part of the disclosure of this specification by this reference thereto.

The method as outlined in the previous two paragraphs enables a pipeline,  
20 conduit or other elongate member to be positioned underground in an effective and relatively inexpensive manner when compared with the methods and costs of alternative existing processes to achieve a similar result.

Further preferred features and aspects of this invention will become apparent from the following description of a preferred embodiment given in  
25 relation to the accompanying drawings, in which:

Fig 1 is a schematic side elevation view of apparatus according to a preferred embodiment of this invention; and

Fig 2 is a partial perspective view of the apparatus of Fig 1.

Referring to the drawings, the apparatus 10 includes a trench forming  
30 machine 11 connected via chain means 12 to pipeline bedding material forming apparatus 13. This apparatus may be generally the same as that shown in Australian Patent Specification No. 18827/02, the disclosure of this specification being hereby included in the current specification to the extent to which it may be

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necessary to understand any aspect of the present invention. The trench forming



THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. Apparatus for forming a trench and preparing a base region of the trench for laying an elongate member such as a pipeline, cable or the like therein, said apparatus including a trench forming machine having excavating means adapted  
5 to excavate the trench as the trench forming machine is moved in a forward direction, bedding material forming means positionable, in use, at least partly above the trench formed by the excavating means of said trench forming machine and being adapted to move simultaneously along said trench with said trench forming machine as the trench forming machine moves in said forward direction,  
10 said apparatus further including conveyor means for conveying at least a portion of excavated trench material created by said excavating means immediately after excavation to said bedding material forming means, said bedding material forming means including separation means for separating fine particulate material from the excavated trench material delivered thereto by said conveyor means  
15 whereby said fine particulate material is adapted to be delivered to the base region of said trench.
2. Apparatus according to claim 1 wherein said bedding material forming means forms an integral part of said trench forming machine.
3. Apparatus according to claim 1 wherein said bedding material forming  
20 means is separate from said trench forming machine but in use is pulled along said trench by connection means to said trench forming machine.
4. Apparatus according to claim 3 wherein said connection means includes one or more cable(s) or chain(s) extending between said trench forming machine and said bedding material forming means.
- 25 5. Apparatus according to claim 4 wherein said cable(s) or chain(s) are angled downwardly from said trench forming machine to said bedding material forming means with a connection of said cable(s) or chain(s) to said bedding material forming means being below an upper edge of said trench.

6. Apparatus according to any one of claims 1 to 5 wherein said conveyor means includes a first conveyor extending transversely relative to said trench said first conveyor being positioned to receive the excavated trench material from said excavating means and to deliver same at a downstream end of said first conveyor  
5 to a second conveyor extending rearwardly to said bedding material forming means.
7. Apparatus according to claim 6 wherein said first conveyor is made up of one or more individual conveyor units.
8. Apparatus according to claim 6 or claim 7 wherein said second conveyor is  
10 made up of one or more individual conveyor units.
9. Apparatus according to any one of claims 6 to 8 wherein baffle means is provided adjacent the downstream end of said first conveyor whereby excavated material on said first conveyor is deposited on said baffle means if the first conveyor is moved at a speed above a first predetermined limit, and onto said  
15 second conveyor if the speed of said first conveyor is below the first predetermined limit, said baffle means being configured to deliver excavated material deposited thereon to a ground position adjacent said trench.
10. Apparatus according to claim 9 further including control means to vary the speed of said first conveyor to thereby selectably vary the amount of excavated  
20 trench material delivered by said second conveyor to said pipeline bedding material forming means.
11. Apparatus according to any one of claims 1 to 10 wherein said trench forming machine includes scraper means arranged to push excavated material thrown out of the trench by said excavating means back into the trench to be  
25 reprocessed by said excavating means.
12. Apparatus according to claim 11 wherein said trench forming machine is supported on crawler track means on either side of the trench being formed by said excavating means, said scraper means being formed by ground engagable

scraper blades positioned rearwardly of each crawler track means and adjacent to said excavating means.

13. Apparatus according to any one of claims 1 to 12 wherein said pipeline bedding material forming means includes a structure positionable in the trench and configured to enable movement along the trench, said structure having a lower region adapted to receive said fine particulate material from said separation means and a lower face leading from said lower region through which said fine particulate material is discharged into a bottom region of said trench.

14. Apparatus according to claim 13 further including adjustable levelling means located rearwardly of the discharge of fine particulate material from said lower region of the structure to adjust the depth of said fine particulate material in said trench.

15. Apparatus according to claim 13 or claim 14 wherein the separating means includes a vibrating screen table that is wider than the trench and is inclined to one side whereby the excavated material deposited thereon that does not pass through the screen table drops from the screen table on said one side to a ground position.

16. Apparatus according to claim 15 wherein support skids are positioned to engage the ground on either side of the trench and on either side of the bedding material forming means in front of any excavated material falling from the vibrating screen table.

17. Apparatus according to claim 16 wherein the height of said support skids relative to the structure within said trench is adjustable.

18. A method of forming a trench and preparing a base region of the trench for laying an elongate member such as a pipeline or cable therein, said method including the steps of providing a trench forming machine and excavating ground material from a zone intended to form the trench while moving said trench forming machine in a forward direction, conveying at least a portion of said ground

material excavated from said zone intended to form the trench immediately after excavation directly to separation apparatus for separating fine particulate material from the excavated ground material and depositing the fine particulate material into the base region of said trench as said separation apparatus is moved along  
5 said trench with said trench forming machine.

19. A method according to claim 18 wherein said separation apparatus includes a portion located in said trench, said portion including means for distributing and levelling the fine particulate material in the base region of the trench.

10 20. A method according to claim 19 wherein said means for distributing and levelling the fine particulate material in the base region of the trench includes means for creating a groove in said fine particulate material into which the elongate member is laid.

15 21. A method according to any one of claims 18 to 20 wherein a portion of the excavated ground material is selectably deposited onto the ground adjacent the trench instead of being conveyed to the separation apparatus.

22. A method according to any one of claims 18 to 21 wherein coarser particulate material of said excavated ground material that is not deposited into the base region of the trench is discharged from said separation apparatus onto  
20 the ground adjacent said trench.

23. A method of laying an elongate member in an underground position, said method including the steps of providing a trench forming machine and excavating ground material from a zone intended to form a trench while moving said trench forming machine in a forward direction, conveying at least a portion of said

excavated ground material from said zone intended to form the trench immediately after excavation directly to first separation apparatus for separating fine particulate material from the excavated ground material and depositing the fine particulate material into a base region of the trench as said first separation  
5 apparatus is moved along said trench, laying said elongate member on said fine particulate material in the base region of said trench, and thereafter passing second separation apparatus along said trench, said second separation apparatus also receiving at least a portion of said excavated ground material and delivering fine particulate material from said excavated ground material into said  
10 trench depositing same around and over said elongate member.

24. A method according to claim 23, wherein said elongate member is a pipeline or conduit of continuous length or of joined separate sections.

25. A method according to claim 23 or claim 24, wherein said first separation apparatus is part of or operationally connected to said trench forming machine.

15 26. A method according to claim 25, wherein said first separation apparatus includes a portion located in said trench, said portion including means for distributing and levelling the fine particulate material in the base region of the trench.

20 27. A method according to claim 26, wherein said means for distributing and levelling the fine particulate material in the base region of the trench includes means for creating a groove in said fine particulate material into which the elongate member is laid.

25 28. A method according to any one of claims 23 to 27, wherein a portion of the excavated ground material is selectably deposited onto the ground adjacent the trench instead of being conveyed to the first separation apparatus.